FOSSIL JELLY FISHES FROM THE MIDDLE CAMBRIAN TERRANE.

By Charles D. Walcott,

Honorary Curator of the Department of Paleontology.

During the past nine years large collections of fossils have been made from the Middle Cambrian shales and limestones of the Coosa Valley, Alabama. At two horizons silicious concretions occur in the fossiliferous shale and, associated with them, what have locally been known as "star cobbles." Some of the latter suggest the sea-urchin, and others that are spread out on flat nodules resemble starfish. It was not until 1893 that I felt assured that the so-called "star cobbles" were fossil Medusæ. There are now more than 8,000 specimens in the collections of the United States Geological Survey. From this ample material two types have been separated that are allied to the recent Discomedusæ.

Numerous fragments of trilobites, etc., of Middle Cambrian age occur in the shale, and they are also attached to and embedded in many of the flattened nodules, and more rarely attached to specimens of the Medusæ. From the large number of specimens that have been found over a relatively small area, it is evident that they were gregarious and very much like the modern Rhizostome (*Polyclonia frondosa*) in their habits.

Two genera and three species have been recognized, namely: *Brooksella*, new genus, *B. alternata*, new species, *B. confusa*, new species, *Laotira*, new genus, and *L. cambria*, new species.

These forms, with *Dactyloidites asteroides* of the Lower Cambrian, may be grouped together in the family Brooksellidæ.

Family BROOKSELLIDÆ.

Discomedusæ with a lobate umbrella; without tentacles and central oral opening in the adult; with a radial canal in each lobe of the exumbrella, and a central stomach; oral arms central or represented by interradial arms or lobes attached to the central axis or to the subumbrella surface; reproduction sexual or by fission.

The following genera are included in the family: *Brooksella*, *Laotira*, and *Dactyloidites*.

BROOKSELLA, new genus.

Discomedusæ with a lobate umbrella, 6, 7, to 12 or more lobes; without tentacles and without (?) central oral opening; with a simple radial

canal in each lobe of the umbrella and in each interradial lobe, when the latter is present. Oral plate quadripartite, with four oral arms starting out from it, but whether these branch or not is unknown. A second type of oral arms may be represented by the interradial lobes. Type, *Brooksella alternata*.

BROOKSELLA ALTERNATA, new species.

(Plate XXXI, figs. 1–5.)

The general form of the umbrella as now known varies from subspherical to a somewhat depressed convex disk. Following Hæckel, the dorsal surface will be called the *exumbrella;* the ventral surface, the *subumbrella:* the central section of the umbrella inclosing the stomach and oral organs, the *umbrella disk*.

In its original form the lobation of the exumbrella was more or less clearly defined and varied. Individuals occur of nearly the same size, with from six to twelve lobes; in some the lobation starts from the center of the umbrella, while in others a secondary system of lobes appears from beneath the upper lobes and gives great irregularity to the surface. The lobation of the umbrella is rarely, if ever, lost; it is the dominant character in all specimens.

The subumbrella varies to nearly as great a degree as the exumbrella; strong ridges or ribs radiate from the center to each of the principal lobes of the exumbrella. Sometimes the lobes separate above, so that there is little more than the central umbrella disk with a series of attached plates, like broad spokes in a wheel. The least compressed specimen is illustrated by Plate XXXI, figs. 2, 2*a*, and 2*b*. This, with Figs. 1, 1*a*, 3, and 3*a*, may be considered the types of the genus and species.

The gastrovascular system consists, as far as known, of a central stomach and a radial canal, which passes from it to each exumbrella lobe and interradial lobe.

No traces of an oral opening have been seen. In a few specimens a circular depression is seen at the base of the central axis, which was probably the locality of the mouth at an early stage in the evolution of the species and the development of the individual. One specimen shows the presence of four oral arms, which form an oral plate where they unite at the center. It is possible that the free interradial lobes or arms, attached to the central axis beneath or between the umbrella lobes, may have served the purpose of oral arms by carrying food to the central stomach. This certainly appears to have been the case in *Brooksella confusa*, where there is no evidence of the presence of regular oral arms.

BROOKSELLA CONFUSA, new species.

(Plate XXXI, figs. 7, 7*a*, 7*b*.)

In the external form and appearance of the exumbrella this species is similar to *B. alternata*, but differs materially in the arrangement of the lobes of the subumbrella. This is shown by the accompanying figure.

The interlobes vary greatly in number and position, as shown by Plate XXXI, fig. 7*a*. The exumbrella surface is shown by Fig. 7*b*. There does not appear to be a true central oral opening; and a careful study of the specimens leads to the view that the free inter and basal lobes or arms served as the oral arms and conveyed food directly to the intestine or stomach in the central axis.

LAOTIRA, new genus.

Discomedusæ with a lobate umbrella, 4, 5, 6, 7, to 12 or more lobes in the simple forms, and with a larger number in the complex forms; without tentacles and without (?) central oral openings; with a simple radial canal in each lobe of the umbrella and in the interradial lobes, attached to the central axis, when they are present; oral arms represented by interradial lobes attached to the central axis and to the subumbrella lobes; reproduction sexual or by fission. Type, *Laotira cambria*.

LAOTIRA CAMBRIA, new species.

(Plate XXXII, figs. 1–8.)

The range of variation in this species is much greater than that of *Brooksella alternata*. Its general characteristics are shown by the figures illustrating it. In the simpler forms it has a radiating structure, very much like that of *B. alternata* (Plate XXXII, figs. 1, 2, and 3). A departure from this is shown in the subumbrella surface of Fig. 3*a*, and still more in Figs. 4 and 4*a*. This is carried still farther in Fig. 5. The tendency of the species to reproduce by fission is shown by Fig. 6.

This species possesses radiating canals in the exumbrella lobes in the simple forms and irregular canals in the complex forms, as shown by Plate XXXI, fig. 8.

No central oral openings have been seen, but there is an unusual development of the oral arms in the simple type; and in the complex type, the variation of which is almost endless, the oral arms appear to be numerous and attached irregularly to the subumbrella surface. This is partly shown by Fig. 4*a*.

This announcement is preliminary to a full illustration and description, which will appear as a monograph of the U. S. Geological Survey. A description will then be given of the mode of occurrence, conditions of preservation, and other facts which may be of interest in connection with this remarkable group of fossil Medusæ.

EXPLANATION OF PLATES.

PLATE XXXI.

Brooksella alternata.

FIG. 1. An exumbrella with nine lobes, and preserving a trace of the corona furrow in the ring about the central disk.

1*a*. View of the under or subumbrella side of fig. 1. The narrow subumbrella lobes are well shown, and also what appears to be the oral arms, *x x*. A slight circular depression at the center (*x'*) may indicate the position of an oral aperture.

FIG. 2. Exumbrella view of an unusually rotund specimen. A projecting interradial lobe or arm is shown at *x*.

2*a*. Subumbrella view of fig. 2. The interradial lobe or arm is shown at *x*, and a broken subumbrella lobe at *b*. The interradial lobe at *a* did not connect with an exumbrella lobe.

2*b*. Side view of 2 and 2*a*. What is considered to be an interradial lobe is shown at *a*.

3. An exumbrella in which the interumbrella lobes are a prominent feature. The appearance is as though one medusa was resting upon and clasping the one beneath. The exumbrella lobes (*a* to *f*), however, merge into the subumbrella lobes, *a* to *f* of fig. 3*a*.

3*a*. Subumbrella view of fig. 3.

4. View of a specimen worn by erosion so as to show the radial canals of the exumbrella lobes.

5. Transverse section, cut so as to show the radial canals of the six umbrella lobes and the central stomach of the umbrella disk.

6. Side view of a specimen in which the subumbrella lobes are shown beneath the broader exumbrella lobes.

Brooksella confusa.

FIGS. 7, 7*a*. Views of the exumbrella and several of the interradial lobes. The relations of the two sets of lobes are shown by the side view, fig. 7*a*.

7*b*. Subumbrella surface of fig. 7. The irregular arrangement of the lobes and the oral arms is well shown.

Laotira cambria.

FIG. 8. Transverse section of an irregularly lobed specimen, showing the arrangement of the exumbrella canals.

PLATE XXXII.

Laotira cambria.

FIG. 1. Subumbrella view of a small specimen with four lobes.

2. Exumbrella view of a small specimen with six lobes. In both figures, 1 and 2, the original form has been obscured by a deposit of silicious matter about the lobes.

3. A typical illustration of the regular variety of the species. It has five principal exumbrella lobes and two small interradial lobes.

3*a*. Subumbrella view of fig. 3. The five subumbrella lobes are united at the center, but not with the same regularity as in *Brooksella alternata*. (See Plate XXXI, fig. 1*a*.)

4. Exumbrella view of an irregularly lobed specimen.

4*a*. Subumbrella view of fig. 4. The slight irregularity of arrangement of fig. 3*a* has increased, and two centers united by a transverse lobe are shown. One of the oral arms is shown at *x*.

5. Dorsal surface of an elongate specimen, in which three centers are connected by lobes radiating from one to the other.

6. A worn specimen in which fission has proceeded so far as to leave but one lobe connecting what are otherwise two individual specimens.[1]

[1] For fission in Medusæ, see Dr. Arnold Lang's memoir on *Gastroblasta raffaeli*.